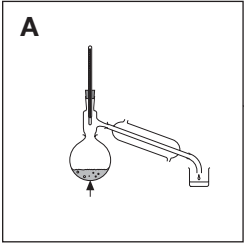
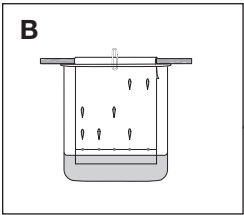
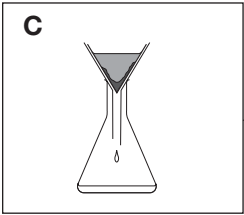


Tier 3–6	Q No 1	2/4a 2/4c	about environmental and inherited causes of variation within a species that selective breeding can lead to new varieties	Tier 3–6	Q No 1
Part	Mark	Answer	Accept	Additional guidance	
(a)	1	* <i>feature</i> : strong muscles	accept 'muscles'	features may be in either order each reason must correspond to the correct feature	
	1	* <i>reason</i> : to pull a sledge <b>or</b> to carry a load			
	1	* <i>feature</i> : thick fur	accept 'fur'	<i>do not accept</i> 'to keep the cold out'	
	1	* <i>reason</i> : to keep them warm <b>or</b> to trap air	accept 'to insulate them'		
(b) (i)	1	* variation ✓		if more than one box is ticked, award no mark	
(ii)	1	* information passed from the mother in an egg ✓		if more than one box is ticked, award no mark	
<b>Total</b>	<b>6</b>				

Tier 3–6	Q No 2	1/2a 1/2i 1/2k 1/2o	use scientific knowledge and understanding to turn ideas into a form that can be investigated, and to decide on an appropriate approach use a wide range of methods, including diagrams, tables, charts, graphs and ICT, to represent and communicate qualitative and quantitative data use observations, measurements and other data to draw conclusions consider whether the evidence is sufficient to support any conclusions or interpretations made	Tier 3–6	Q No 2
Part	Mark	Answer	Accept	Additional guidance	
(a)	1	* 0	accept the correct answer written outside the table		
(b)	1	any <b>one</b> from * how many seeds germinated at different temperatures? * how many seeds grew or started to grow at different temperatures? * how long does it take seeds to grow <b>or</b> germinate at different temperatures?	accept 'which seeds grow at different temperatures?'  accept 'how does temperature affect germination?' accept 'which is the best temperature for seeds to grow?'  accept statements which are not framed as questions such as 'the number of seeds germinating at different temperatures'	<b>the answer must include both a dependent and an independent variable</b>  award one mark for identifying temperature as the independent variable and either the number of seeds germinating <b>or</b> the time taken to germinate as the dependent variable  <i>do not</i> accept a conclusion such as 'more seeds grew at higher temperatures' <i>do not</i> accept 'how long does it take for lettuce seeds to germinate?' as there is no reference to temperature	
(c)	2	* true ✓ cannot tell ✓ false ✓ false ✓		if <b>all four</b> answers are correct, award two marks if three <b>or</b> two answers are correct, award one mark if more than one box is ticked in any row, award no mark for that row	
<b>Total</b>	<b>4</b>				

<b>Tier 3–6</b>	<b>Q No 3</b>	2/1a 2/1c 2/1d 2/2g	that animal and plant cells can form tissues, and tissues can form organs ways in which some cells, including ciliated epithelial cells, sperm, ova, and root hair cells, are adapted to their functions that fertilisation in humans and flowering plants is the fusion of a male and female cell about the human reproductive system, including the menstrual cycle and fertilisation	<b>Tier 3–6</b>	<b>Q No 3</b>
<b>Part</b>	<b>Mark</b>	<b>Answer</b>	<b>Accept</b>	<b>Additional guidance</b>	
(a)	1	* cells ✓		if more than one box is ticked, award no mark	
(b)	1	* tail			
(c)	1	* testis <b>or</b> testicle	accept plurals		
(d)	1	* fertilisation ✓		if more than one box is ticked, award no mark	
<b>Total</b>	<b>4</b>				

Tier 3–6	Q No 4	3/1h how to separate mixtures into their constituents using distillation, chromatography and other appropriate methods		Tier 3–6	Q No 4
Part	Mark	Answer	Accept	Additional guidance	
(a)	1  1  1	<p>* <b>A</b></p>  <p>* <b>B</b></p>  <p>* <b>C</b></p> 	<p>chromatography</p> <p>distillation</p> <p>filtration</p> <p>crystallisation</p>	<p>if more than one line is drawn from a diagram, award no mark for that diagram</p>	
(b) (i)	1	* C	accept 'filtration'		
(ii)	1	* A	accept 'distillation'		
<b>Total</b>	<b>5</b>				

Tier 3–6	Q No 5	3/1d 3/1h 3/3a	how elements vary widely in their physical properties, including appearance, state at room temperature, magnetic properties and thermal and electrical conductivity, and how these properties can be used to classify elements as metals or non-metals how to separate mixtures into their constituents using distillation, chromatography and other appropriate methods how metals react with oxygen, water, acids and oxides of other metals, and what the products of these reactions are	Tier 3–6	Q No 5
Part	Mark	Answer	Accept	Additional guidance	
(a)	1	* an element ✓		if more than one box is ticked, award no mark	
(b) (i)	1	* it stays shiny		answers may be in either order	
(ii)	1 1	* it conducts electricity * it conducts heat	accept 'it conducts' for one mark if neither of the fully correct answers is given  accept 'it stays shiny'		
(c)	1	* water			
(d)	1	any <b>one</b> from * a magnet * an electromagnet			
<b>Total</b>	<b>6</b>				

Part	Mark	Answer	Accept	Additional guidance
Tier 3–6	Q No 6	1/2j 3/1b 3/1e 3/2i 4/5a	use diagrams, tables, charts and graphs, including lines of best fit, to identify and describe patterns or relationships in data how the particle theory of matter can be used to explain the properties of solids, liquids and gases, including changes of state, gas pressure and diffusion how elements combine through chemical reactions to form compounds, <i>for example, water, carbon dioxide, magnesium oxide, sodium chloride, most minerals</i> , with a definite composition about possible effects of burning fossil fuels on the environment, <i>for example, production of acid rain, carbon dioxide and solid particles</i> , and how these effects can be minimised about the variety of energy resources, including oil, gas, coal, biomass, food, wind, waves and batteries, and the distinction between renewable and non-renewable resources	Tier 3–6 Q No 6
(a)	1	* ethanol <b>or</b> alcohol		if more than one box is ticked, award no mark
(b)	1	any <b>one</b> from * burning hydrogen does not produce carbon monoxide * burning hydrogen does not produce sulphur dioxide * burning hydrogen only produces water * burning petrol causes acid rain	accept 'petrol <b>or</b> ethanol <b>or</b> alcohol produces carbon monoxide' accept 'petrol produces sulphur dioxide'  accept 'hydrogen <b>or</b> ethanol <b>or</b> alcohol does not cause acid rain'	
(c)	1	* hydrogen	accept 'H <sub>2</sub> ' accept 'gas'	
(d)	1	* oxygen ✓		if more than one box is ticked, award no mark
(e)	1	any <b>one</b> from * it can be grown * it can be replanted * it is renewable * it can be reproduced	accept 'it does not take long to grow' accept 'it can be replaced'  accept 'it produces seeds'	
<b>Total</b>	<b>5</b>			

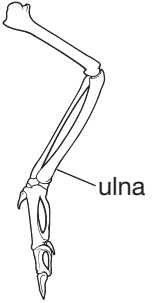
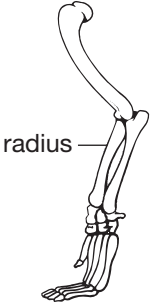
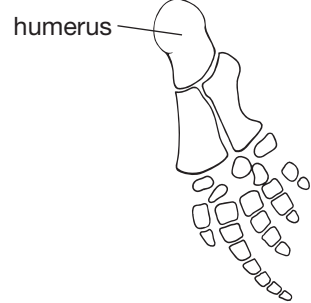
Tier 3–6	Q No 7	1/2k 4/4b 4/5g	use observations, measurements and other data to draw conclusions the relative positions of the Earth, Sun and planets in the solar system that although energy is always conserved, it may be dissipated, reducing its availability as a resource	Tier 3–6	Q No 7
Part	Mark	Answer	Accept	Additional guidance	
(a)	1	* The Moon is nearer to the Earth than the Sun is. ✓		if more than one box is ticked, award no mark	
(b) (i)	1	* 11.16	accept any number from 11.15 to 11.17		
(ii)	1	* it decreased <b>or</b> went down  because the Moon blocked the Sun's heat <b>or</b> rays <b>or</b> radiation	accept 'there was no sunlight to give heat'  accept 'there was no Sun to make it warm' accept 'there was no heat from the Sun' accept 'there was no Sun'	<b>both</b> the answer and the reason are required for the mark <i>do not accept</i> 'it blocked the Sun's light'	
<b>Total</b>	<b>3</b>				

Part	Mark	Answer	Accept	Additional guidance
Tier 3–6	Q No 8	1/2c 1/2d 1/2e 1/2k	carry out preliminary work and to make predictions, where appropriate consider key factors that need to be taken into account when collecting evidence, and how evidence may be collected in contexts, <i>for example, fieldwork, surveys</i> , in which the variables cannot readily be controlled decide the extent and range of data to be collected and the techniques, equipment and materials to use, <i>for example, appropriate sample size for biological work</i> use observations, measurements and other data to draw conclusions	Tier 3–6 Q No 8
(a)	1	* ruler ✓		if more than one box is ticked, award no mark
(b)	1	any <b>one</b> from * tubes had different widths * the tubes had different bores * he blew in different ways * different thickness of paper * different paper	accept 'tubes had different shapes'  accept 'tubes were different sizes' accept 'tubes are one big, one medium, one little'	do <b>not</b> accept 'different lengths'
(c)	1	* the longer tube will make a lower sound ✓		if more than one box is ticked, award no mark
(d)	1	* 5		
<b>Total</b>	<b>4</b>			



Tier 3–6	Q No 9	1/2i 1/2j 1/2k 4/3i	use a wide range of methods, including diagrams, tables, charts, graphs and ICT, to represent and communicate qualitative and quantitative data use diagrams, tables, charts and graphs, including lines of best fit, to identify and describe patterns or relationships in data use observations, measurements and other data to draw conclusions that light can travel through a vacuum but sound cannot, and that light travels much faster than sound	Tier 3–6	Q No 9
Part	Mark	Answer	Accept	Additional guidance	
(a)	1	any <b>one</b> from * light travels faster than sound * sound travels more slowly than light	accept 'light travels faster' accept 'sound travels slower' accept 'light is faster than sound'	<i>do not accept</i> 'light travels fast' or 'sound travels slow' <i>do not accept</i> 'light travels before sound'	
(b) (i)	1	* a bar halfway between 8 and 10 seconds		the top of the bar must be in the middle third between 8 and 10	
(ii)	1	* C	accept '3.0'		
(iii)	1	any <b>one</b> from * the storm became closer then moved further away * towards then away from Omar * the distance decreased then increased	accept 'the storm passed over' <b>or</b> 'it passed by'  accept 'at flash A Omar was closer and at flash F Omar was further' accept 'it increased' accept 'it went further away'		
<b>Total</b>	<b>4</b>				

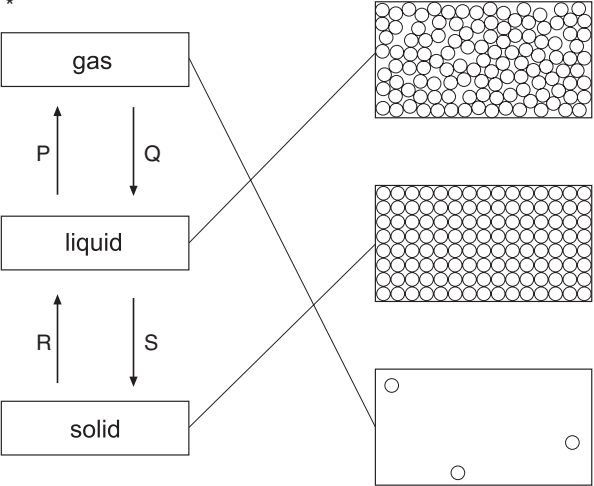


Part	Mark	Answer	Accept	Additional guidance	
Tier 3–6 5–7	Q No 11 1	1/2j 2/2e 2/4b 2/5c	use diagrams, tables, charts and graphs, including lines of best fit, to identify and describe patterns or relationships in data the role of the skeleton and joints and the principle of antagonistic muscle pairs, <i>for example, biceps and triceps</i> , in movement to classify living things into the major taxonomic groups how some organisms are adapted to survive daily and seasonal changes in their habitats	Tier 3–6 5–7 Q No 11 1	
(a)	1	* vertebrates	accept 'animals with backbones'	<i>do not accept</i> 'warm blooded'	
(b)	3	* (i)  ulna	* (ii)  radius	* (iii)  humerus	award one mark for each correct label
(c)	1	any <b>one</b> from * paddle shaped  * fin-like * wide bones * streamlined	accept 'large surface' accept 'it is thick' accept 'it is a big fin' accept 'big bones'	<i>do not accept</i> 'it is big' <b>or</b> 'it is strong' <i>do not accept</i> 'it can paddle in water'  'it is flexible' is insufficient	
(d)	1	* they are light	accept 'they make the bird lighter'		
<b>Total</b>	<b>6</b>				

Part	Mark	Answer	Accept	Additional guidance
(a) (i)	1	* Amy <i>and</i> Kisham		answers may be in either order <b>both</b> answers are required for the mark
(ii)	1	any <b>one</b> from * traffic pollution <b>or</b> air pollution * passive smoking * faulty gas fires <b>or</b> faulty gas heaters		'pollution' is insufficient
(b)	2	any <b>two</b> from * smokers have a higher concentration of carbon monoxide in the blood * the blood of smokers contains <b>or</b> transports less oxygen * smokers breathe more quickly to try to get enough oxygen <b>or</b> air	accept 'they have a lot of carbon monoxide in their blood' accept 'not enough oxygen gets to the muscles <b>or</b> to other parts of the body <b>or</b> to the other cells'  accept 'smoke contains carbon monoxide' <b>or</b> accept 'smokers breathe in more carbon monoxide'	<i>do not accept</i> 'stops the blood taking up oxygen'  <i>do not accept</i> 'less oxygen gets into the lungs'
<b>Total</b>	<b>4</b>			

Tier 3–6 5–7	Q No 13 3	2/1b the functions of chloroplasts and cell walls in plant cells and the functions of the cell membrane, cytoplasm and nucleus in both plant and animal cells 2/1e to relate cells and cell functions to life processes in a variety of organisms	Tier 3–6 5–7	Q No 13 3
Part	Mark	Answer	Accept	Additional guidance
(a) (i)	1 1	* cell membrane * cytoplasm	accept 'membrane'	answers must be in the correct order
(ii)	2	any <b>two</b> from * cell wall * chloroplast * large vacuole	accept 'chlorophyll' accept 'vacuole'	
(b)	1 1 1	<div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">* white blood cell</div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">absorbs light</div> <div style="border: 1px solid black; padding: 5px;">to prevent disease</div> </div> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">* leaf cell</div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">transports oxygen</div> <div style="border: 1px dashed black; padding: 5px;">to digest food</div> </div> <div style="display: flex; align-items: center; margin-bottom: 10px;"> <div style="border: 1px dashed black; padding: 5px; margin-right: 10px;">cell in the intestine</div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">traps micro-organisms</div> <div style="border: 1px solid black; padding: 5px;">for respiration</div> </div> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">* red blood cell</div> <div style="border: 1px dashed black; padding: 5px; margin-right: 10px;">produces enzymes</div> <div style="border: 1px solid black; padding: 5px;">for photosynthesis</div> </div> </div>		if more than one line is drawn from any cell <b>or</b> function, award no mark for those linkages
<b>Total</b>	<b>7</b>			

Part	Mark	Answer	Accept	Additional guidance												
(a) (i)	2	<i>magnesium + * oxygen → * magnesium oxide</i>		<i>do not accept formulae</i>												
(ii)	1	any <b>one</b> from * the oxygen had mass * oxygen was added to the magnesium * the magnesium has reacted with oxygen	accept 'magnesium has gained an element' accept 'magnesium is now part of a compound'	<i>do not accept 'air' for oxygen</i>												
(b)	1	* oxygen	accept 'O <sub>2</sub> '													
(c)	1	* zinc oxide	accept 'ZnO'													
(d)	1	* <table border="1"> <thead> <tr> <th></th> <th>chemical change</th> <th>physical change</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>✓</td> <td></td> </tr> <tr> <td>B</td> <td>✓</td> <td></td> </tr> <tr> <td>C</td> <td></td> <td>✓</td> </tr> </tbody> </table>		chemical change	physical change	A	✓		B	✓		C		✓		<b>all three</b> ticks are required for the mark
	chemical change	physical change														
A	✓															
B	✓															
C		✓														
<b>Total</b>	<b>6</b>															

Tier 3–6 5–7	Q No 15 5	3/1a how materials can be characterised by melting point, boiling point and density 3/1b how the particle theory of matter can be used to explain the properties of solids, liquids and gases, including changes of state, gas pressure and diffusion 3/1c that the elements are shown in the periodic table and consist of atoms, which can be represented by symbols 3/2c to relate changes of state to energy transfers 3/2i about possible effects of burning fossil fuels on the environment, <i>for example, production of acid rain, carbon dioxide and solid particles</i> , and how these effects can be minimised	Tier 3–6 5–7	Q No 15 5
Part	Mark	Answer	Accept	Additional guidance
(a) (i)	1	<p>* </p>		all three lines must be correct for the mark
(ii)	1 1	<p>* evaporation: P * melting: R</p>		
(b) (i)	1	* liquid		
(ii)	1	* carbon		answers must be in the correct order
(iii)	1	* hydrogen		
(iii)	1	* carbon dioxide	accept 'CO <sub>2</sub> ' accept 'carbon monoxide' or 'CO' accept 'carbon' or 'soot'	
<b>Total</b>	<b>7</b>			

Part	Mark	Answer	Accept	Additional guidance
Tier 3–6 5–7	Q No 16 6	3/1b how the particle theory of matter can be used to explain the properties of solids, liquids and gases, including changes of state, gas pressure and diffusion 4/1a how to design and construct series and parallel circuits, and how to measure current and voltage 4/1b that the current in a series circuit depends on the number of cells and the number and nature of other components and that current is not 'used up' by components 4/5e ways in which energy can be usefully transferred and stored		Tier 3–6 5–7 Q No 16 6
(a) (i)	1	* circuit A: series circuit B: parallel		<b>both</b> answers are required for the mark
(b) (i)	1	* the circuit <b>or</b> heating element will stop working	accept 'it will not work' <b>or</b> 'it will be off' accept 'the whole circuit has no current through it' accept 'it becomes cooler'	<i>do not accept</i> 'it breaks the heater <b>or</b> element <b>or</b> it'
(ii)	1	any <b>one</b> from * the circuit <b>or</b> element will continue to work * one wire will not heat the window	accept 'the bottom one has no current through it' accept 'it will work less well' accept 'the bottom wire becomes cooler'	'nothing' <b>or</b> 'it will not be affected' are insufficient <i>do not accept</i> 'it becomes cooler' <i>do not accept</i> 'it does not work properly'
(c) (i)	1	* thermal	accept 'heat'	
(ii)	1	* <i>from solid to liquid to gas</i>	accept ' <i>from solid to liquid to vapour or steam</i> ' accept ' <i>from ice to water to vapour or gas</i> '	<b>all three</b> states are required for the mark
<b>Total</b>	<b>5</b>			



Tier 3–6 5–7	Q No 17 7	4/4c 4/4d	about the movements of planets around the Sun and to relate these to gravitational forces that the Sun and other stars are light sources and that the planets and other bodies are seen by reflected light	Tier 3–6 5–7	Q No 17 7
Part	Mark	Answer	Accept	Additional guidance	
(a)	1	* gravitational pull of the Sun <b>or</b> the Sun's gravity	accept 'gravity' accept 'weight'		
(b)	2	any <b>two</b> from * its average speed is lower  * for most of its orbit the Sun's gravity is less  * its orbit is longer * for most of its orbit it is further from the Sun	accept 'its speed is slower' <b>or</b> 'it travels more slowly' accept 'the pull of the Sun is weaker' <b>or</b> 'gravity is less' accept 'it travels further' <b>or</b> 'the orbit is bigger' accept 'it is further from the Sun' <b>or</b> 'further away'		
(c) (i)	1 1	* light from the Sun * reflects off Pluto and Neptune <b>or</b> the planets <b>or</b> them	accept for two marks 'sunlight reflects off them'	award the second mark only for 'the Sun reflects off the planets'	
(ii)	1	any <b>one</b> from * it is smaller * it reflects less light * it absorbs more light	accept 'it is small'  accept 'it is darker and smaller'	<i>do not accept</i> 'it is further away (from the Earth)' <b>or</b> 'it is further from the Sun' <i>do not accept</i> 'it is darker'	
<b>Total</b>	<b>6</b>				

Tier 3–6 5–7	Q No 18 8	1/2k 1/2l 1/2o	use observations, measurements and other data to draw conclusions decide to what extent these conclusions support a prediction or enable further predictions to be made consider whether the evidence is sufficient to support any conclusions or interpretations made	Tier 3–6 5–7	Q No 18 8
Part	Mark	Answer	Accept	Additional guidance	
(a)	1	* A and B		answers may be in either order <b>both</b> answers are required for the mark	
(b) (i)	1	any <b>one</b> from * the longer the string, the longer it takes * the longer the string the more time it takes	accept the converse	references to both length and time are required for the mark	
(ii)	1	* A and C and D	accept 'B and C and D' if part (a) is correct	answers may be in any order <b>all three</b> answers are required for the mark	
(c)	1	* E: 10.0 F: from 18 to 25	accept '10'	<b>both</b> answers are required for the mark	
<b>Total</b>	<b>4</b>				